

Fingerprint Sensors using Membrane Switch Arrays**ABSTRACT**

A sensor for identifying fingerprints or other skin textures includes an array of cells each including a membrane switch. Each switch includes a fixed lower electrode disposed on a chip substrate, and a flexible membrane disposed over the lower electrode and capable of flexing downward to establish electrical contact between the lower electrode and an upper electrode. The upper electrode can form the membrane itself or a layer of the membrane, or can be attached to other membrane layers. Switches situated underneath skin ridges change state (e.g. are closed) by the applied pressure, while switches underneath skin valleys remain in their quiescent state (e.g. open). Adjacent switch chambers are connected by fluid tunnels which allow the passage of air between the chambers. Each chamber is substantially closed to the exterior of the sensor, such that particles from the environment cannot contaminate the switch contact surface defined between the switch electrodes. The cells are preferably not hermetically sealed, such that the pressure within the chamber interiors can stay equal to the external (atmospheric) pressure in varying environmental conditions. The membrane design of the cells according to the preferred embodiment allows improved sensor robustness, enhanced resistance to impact forces, decreased vulnerability to particle contamination, and reduced inter-cell crosstalk.